

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : OIL DRIVE KOGYO KK

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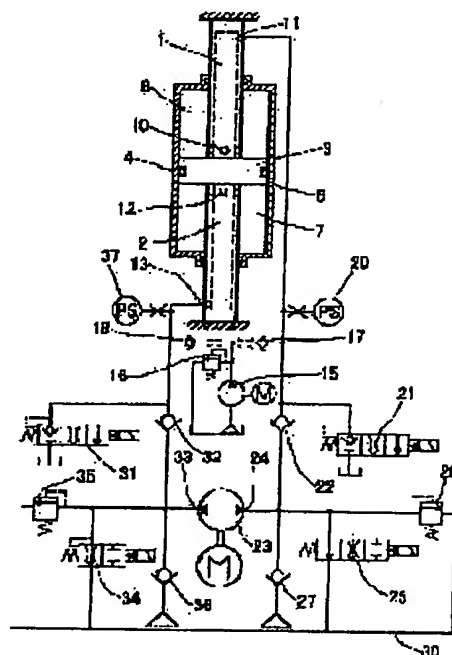
(72)Inventor : HASEGAWA FUMINORI

## (54) MOVABLE CYLINDER AND HYDRAULIC ELEVATOR USING IT

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To reduce cost by reducing the weight of a cylinder device used for a hydraulic elevator.

**SOLUTION:** The lower end of a hollow upper piston rod 1 is fixed to the upper face of a piston 3, and an upper side inner port 10 is provided near there in communication with the hollow portion and an upper side outer port 11 is provided near the upper end as a fixed point of the upper piston rod 1 in communication with the hollow portion. The upper end of a hollow lower piston rod 2 is fixed to the lower face of the piston 3, and an lower side inner port 12 is provided near there in communication with the hollow portion and a lower side outer port 13 is provided near the lower end as a fixed point of the lower piston rod 2 in communication with the hollow portion. An upper cylinder chamber 6 on the upper side of the piston 3 and a lower cylinder chamber 7 on the lower side of the piston 3 are provided in a cylinder tube 5 slidable vertically with the inner periphery being inscribed on the outer periphery of the piston 3.



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## CLAIMS

[Claim(s)]

[Claim 1] The top internal port which fixes the lower limit of an up piston rod in the air to the top face of a piston, and is open for free passage to the near at this centrum is prepared. The top external port which is open for free passage to the near at this centrum by making the upper limit of this up piston rod into the fixed point is prepared. The bottom internal port which fixes the upper limit of a lower piston rod in the air to the inferior surface of tongue of this piston, and is open for free passage to the near at this centrum is prepared. The bottom external port which is open for free passage to the near at this centrum by making the lower limit of this lower piston rod into the fixed point is prepared. While inner skin is furthermore inscribed in this piston peripheral face, in the cylinder tube which can slide up and down It comes to prepare the up cylinder room above this piston, and the lower cylinder room below this piston. Send in hydraulic oil from a top external port, and the up cylinder interior of a room is supplied through a top internal port. A cylinder tube is raised by making coincidence discharge the hydraulic oil of the lower cylinder interior of a room. Moreover, movable cylinder equipment characterized by dropping a cylinder tube by sending in hydraulic oil from a bottom external port, supplying the lower cylinder interior of a room through a bottom internal port, and making coincidence discharge the hydraulic oil of the up cylinder interior of a room.

[Claim 2] The cylinder tube which really combined the wait with the cylinder tube of movable cylinder equipment according to claim 1, or this Make it engage with the other end of the rope which hung the conveyance cage at the tip, and the check valve for up cylinder room discharge oils and the electromagnetic-control valve for up cylinder room discharge oils are connected with the top external port of this movable cylinder equipment. This check valve is minded. And one regurgitation port of a 2-way regurgitation mold hydraulic pump, The check valve for oil inhalation, the electromagnetic-control valve for up cylinder room oil supply, and the relief valve for up cylinder room oil supply are connected. Furthermore, the check valve for lower cylinder room discharge oils and the electromagnetic-control valve for lower cylinder room discharge oils are connected with a bottom external port. This check valve is minded. And the regurgitation port of another side of a 2-way regurgitation mold hydraulic pump, The hydraulic lift characterized by having connected the check valve for oil inhalation, the electromagnetic-control valve for lower cylinder room oil supply, and the relief valve for lower cylinder room oil supply, and attaching a pressure switch in either or the both sides of a top external port and a bottom external port further.

[Claim 3] The hydraulic lift according to claim 2 which connected the relief valve with the regurgitation port of the hydraulic pump for hydraulic oil supply, branched and connected this regurgitation port with the top external port and the bottom external port through the check valve, respectively further.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] A cylinder-tube side can manufacture this invention cheaply especially about the hydraulic lift using the movable cylinder and this which carry out movable.

[0002]

[Description of the Prior Art] As a hydraulic lift, the energy-saving mold hydraulic lift which consists of a balance mold hydraulic lift which opened for free passage the cylinder tube of the hydraulic lift of an independent mold which prepared the direct haulage cage in the upper limit of the piston rod attached in one, or such an independent mold hydraulic lift, and the cylinder tube which fixed the balance weight at the tip of a piston rod is in the movable piston which slides on the inside of the fixed cylinder tube up and down conventionally.

[0003]

[Problem(s) to be Solved by the Invention] In this kind of conventional-type hydraulic lift, the piston rod will always support the load of a conveyance cage. And since it was downward, the compressive load was always acting on this piston rod, and the direction of a load had to enlarge the size of a piston rod considerably, in order to oppose this. For this reason, weight was heavy and cost's was [ the conventional hydraulic lift ] high. The purpose of this invention is the lightweight hydraulic lift which reduced cost, and it is in obtaining what moreover does not use inverter control expensive as a control system.

[0004]

[Means for Solving the Problem] To the above-mentioned technical problem, this invention was examined variously, was made, and is solved by using the new movable cylinder equipment with which a tensile load always acts on a piston rod.

[0005] Namely, the top internal port which the movable cylinder equipment of this invention fixes the lower limit of an up piston rod in the air to the top face of a piston, and is open for free passage to the near at this centrum is prepared. The top external port which is open for free passage to the near at this centrum by making the upper limit of this up piston rod into the fixed point is prepared. The bottom internal port which fixes the upper limit of a lower piston rod in the air to the inferior surface of tongue of this piston, and is open for free passage to the near at this centrum is prepared. The bottom external port which is open for free passage to the near at this centrum by making the lower limit of this lower piston rod into the fixed point is prepared. While inner skin is furthermore inscribed in this piston peripheral face, in the cylinder tube which can slide up and down It comes to prepare the up cylinder room above this piston, and the lower cylinder room below this piston. Send in hydraulic oil from a top external port, and the up cylinder interior of a room is supplied through a top internal port. A cylinder tube is raised by making coincidence discharge the hydraulic oil of the lower cylinder interior of a room. Moreover, it is movable cylinder equipment characterized by dropping a cylinder tube by sending in hydraulic oil from a bottom external port, supplying the lower cylinder interior of a room through a bottom internal port, and making coincidence discharge the hydraulic oil of the up cylinder interior of a

room.

[0006] The hydraulic lift of this invention moreover, the cylinder tube which really combined the wait with the cylinder tube of above movable cylinder equipment, or this Make it engage with the other end of the rope which hung the conveyance cage at the tip, and the check valve for up cylinder room discharge oils and the electromagnetic-control valve for up cylinder room discharge oils are connected with the top external port of this movable cylinder equipment.

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**TECHNICAL FIELD**

[Field of the Invention] A cylinder-tube side can manufacture this invention cheaply especially about the hydraulic lift using the movable cylinder and this which carry out movable.

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**PRIOR ART**

[Description of the Prior Art] As a hydraulic lift, the energy-saving mold hydraulic lift which consists of a balance mold hydraulic lift which opened for free passage the cylinder tube of the hydraulic lift of an independent mold which prepared the direct haulage cage in the upper limit of the piston rod attached in one, or such an independent mold hydraulic lift, and the cylinder tube which fixed the balance weight at the tip of a piston rod is in the movable piston which slides on the inside of the fixed cylinder tube up and down conventionally.

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**EFFECT OF THE INVENTION**

[Effect of the Invention] Thus, according to this invention, since it is movable cylinder equipment using a piston rod with a more thin path, it is lightweight and the low hydraulic lift of cost is obtained. Moreover, although two hydraulic pumps were required when carrying out a meter out control respectively conventionally at the time of rise descent, according to this invention, there is effectiveness which can be managed with one set. Control by the induction motor is possible, without furthermore adopting inverter control.

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**TECHNICAL PROBLEM**

[Problem(s) to be Solved by the Invention] In this kind of conventional-type hydraulic lift, the piston rod will always support the load of a conveyance cage. And since it was downward, the compressive load was always acting on this piston rod, and the direction of a load had to enlarge the size of a piston rod considerably, in order to oppose this. For this reason, weight was heavy and cost's was [ the conventional hydraulic lift ] high. The purpose of this invention is the lightweight hydraulic lift which reduced cost, and it is in obtaining what moreover does not use inverter control expensive as a control system.

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**MEANS**

[Means for Solving the Problem] To the above-mentioned technical problem, this invention was examined variously, was made, and is solved by using the new movable cylinder equipment with which a tensile load always acts on a piston rod.

[0005] Namely, the top internal port which the movable cylinder equipment of this invention fixes the lower limit of an up piston rod in the air to the top face of a piston, and is open for free passage to the near at this centrum is prepared. The top external port which is open for free passage to the near at this centrum by making the upper limit of this up piston rod into the fixed point is prepared. The bottom internal port which fixes the upper limit of a lower piston rod in the air to the inferior surface of tongue of this piston, and is open for free passage to the near at this centrum is prepared. The bottom external port which is open for free passage to the near at this centrum by making the lower limit of this lower piston rod into the fixed point is prepared. While inner skin is furthermore inscribed in this piston peripheral face, in the cylinder tube which can slide up and down It comes to prepare the up cylinder room above this piston, and the lower cylinder room below this piston. Send in hydraulic oil from a top external port, and the up cylinder interior of a room is supplied through a top internal port. A cylinder tube is raised by making coincidence discharge the hydraulic oil of the lower cylinder interior of a room. Moreover, it is movable cylinder equipment characterized by dropping a cylinder tube by sending in hydraulic oil from a bottom external port, supplying the lower cylinder interior of a room through a bottom internal port, and making coincidence discharge the hydraulic oil of the up cylinder interior of a room.

[0006] The hydraulic lift of this invention moreover, the cylinder tube which really combined the wait with the cylinder tube of above movable cylinder equipment, or this Make it engage with the other end of the rope which hung the conveyance cage at the tip, and the check valve for up cylinder room discharge oils and the electromagnetic-control valve for up cylinder room discharge oils are connected with the top external port of this movable cylinder equipment. This check valve is minded. And one regurgitation port of a 2-way regurgitation mold hydraulic pump, The check valve for oil inhalation, the electromagnetic-control valve for up cylinder room oil supply, and the relief valve for up cylinder room oil supply are connected. Furthermore, the check valve for lower cylinder room discharge oils and the electromagnetic-control valve for lower cylinder room discharge oils are connected with a bottom external port. This check valve is minded. And the regurgitation port of another side of a 2-way regurgitation mold hydraulic pump, The check valve for oil inhalation, the electromagnetic-control valve for lower cylinder room oil supply, and the relief valve for lower cylinder room oil supply are connected. It is the hydraulic lift characterized by furthermore attaching a pressure switch in either or the both sides of a top external port and a bottom external port. Under the present circumstances, it is good to connect a relief valve with the regurgitation port of the hydraulic pump for hydraulic oil supply, to branch and to connect this regurgitation port with a top external port and a bottom external port through a check valve, respectively further.

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## EXAMPLE

[Example] The example of this invention is explained below.

[0008] (Example 1) An example of the movable cylinder equipment of this invention is shown in drawing 1. The fixed piston (3) was fixed between the lower limit of the up piston rod (1) in the air with which upper limit was fixed to the head-lining sections, such as a building, and the upper limit of the lower piston rod (2) in the air with which the lower limit was fixed to floors, such as a building. And the ring-like seal member (4) was attached in the peripheral face of this fixed piston (3), and it prepared so that close sliding of the inferior-surface-of-tongue plate which takes up the top-face plate which plugs up the cylindrical cylinder tube (5) which has the inner skin which slides up and down while maintaining this peripheral face and a fluid-tight condition further for the upper limit side, and its lower limit side might be changed into a fluid-tight condition at the peripheral face of this up piston rod (1), and the peripheral face of a lower piston rod (2), respectively. Therefore, an up cylinder room (6) is formed above the fixed piston (3) in this cylinder tube (5), and a lower cylinder room (7) is formed in this fixed piston (3) bottom at coincidence. Moreover, the centrum of an up piston rod (1) is open for free passage to the external hydraulic circuit through the top external port (11) which opened for free passage in this up cylinder room (6) through the top internal port (10) which carried out opening into the up cylinder room (6), and carried out opening to the upper limit section. Furthermore, the centrum of a lower piston rod (2) is open for free passage to the external hydraulic circuit through the bottom external port (13) which opened for free passage in this lower cylinder room (7) through the bottom internal port (12) which carried out opening into the lower cylinder room (7), and carried out opening to the lower limit section.

[0009] When a motion of such movable cylinder equipment is explained, a cylinder tube (5) will go up by supplying hydraulic oil to a top external port (11) from an external hydraulic circuit, and sending in in an up cylinder room (6) through a top internal port (10). At this time, the hydraulic oil in a lower cylinder room (7) is discharged by coincidence through a bottom external port (13). By supplying hydraulic oil to an another side bottom external port (13), and sending in in a lower cylinder room (7) through a bottom internal port (12), a cylinder tube (5) will descend and the hydraulic oil in an up cylinder room (6) is discharged by coincidence from a top external port (11).

[0010] Since an up piston rod will support most, such as weight of the hydraulic oil in the load and cylinder tube which act on the weight of members, such as a cylinder tube and a fixed piston, and this cylinder tube, by pull strength according to the movable cylinder equipment of a more than, the size of this piston rod does not become so large. Therefore, the weight of the whole equipment also becomes small and serves as space-saving.

[0011] (Example 2) The hydraulic lift which used such movable cylinder equipment next is explained. The hydraulic circuit which drives the above-mentioned movable cylinder first is explained. As written together to drawing 1, prepare an up pressure switch (20) and the electromagnetic-control valve for up cylinder room discharge oils (21) in piping which is open for free passage in a top external port (11), and the check valve for up cylinder room discharge oils (22) is minded further. One electromagnetic-control valve for regurgitation port (24) up cylinder room oil supply (25) and relief valve for up cylinder room

oil supply (26) of a 2-way regurgitation mold hydraulic pump (23) were connected, and the check valve for oil inhalation (27) was further prepared in one [ this ] regurgitation port (24). In addition, the port of another side of the above-mentioned electromagnetic-control valve for up cylinder room discharge oils (21) and the electromagnetic-control valve for up cylinder room oil supply (25) was open for free passage to the oil tank (30).

[0012] Moreover, prepare a lower pressure switch (37) and the electromagnetic-control valve for lower cylinder room discharge oils (31) in piping which is open for free passage in a bottom external port (13), and the check valve for lower cylinder room discharge oils (32) is minded further. The electromagnetic-control valve for regurgitation port (33) lower cylinder room oil supply (34) and the relief valve for lower cylinder room oil supply (35) of another side of a 2-way regurgitation mold hydraulic pump (23) were connected, and the check valve for oil inhalation (36) was further prepared in the regurgitation port (33) of this another side. In addition, the port of another side of the above-mentioned electromagnetic-control valve for lower cylinder room discharge oils (31) and the electromagnetic-control valve for lower cylinder room oil supply (34) was open for free passage to the oil tank (30).

[0013] The following circuits were added in order to fill up hydraulic oil in the above-mentioned cylinder tube (5) furthermore. That is, the relief valve for supply circuits (16) was connected with the regurgitation port of the hydraulic pump for hydraulic oil supply (15), further, it branched to two, one side connected all with the top external port (11) through the check valve for supply circuits (17), and (18), and another side connected this regurgitation port with the bottom external port (13).

[0014] Moreover, in order to use such movable cylinder equipment as a hydraulic lift For example, as shown in drawing 2 , a balance weight (40) is fixed to the above-mentioned cylinder tube (5) and one. A cylinder side pulley (41) is attached in this balance weight (40). The configuration which fastened this cylinder side pulley (41), the 1st pulley (42), and the 2nd pulley (43) with the rope (44) which furthermore attached the 1st pulley (42) and the 2nd pulley (43) in the building side, and fixed the end to the head-lining section of a building, and attached the conveyance cage (45) in the other end is taken. Or the configuration which fastened the 1st and 2nd same pulleys (42) as the above and (43) with the rope (44) which took the conveyance cage (45) to the other end as shown in drawing 3 , and fixed the other end to the cylinder tube (5) or the balance weight (40) is adopted. the above -- also in which hydraulic lift, when a conveyance cage (45) descends when raising a cylinder tube (5), and dropping this cylinder tube (5), this conveyance cage (45) goes up. In addition, in order to move the above-mentioned cylinder tube up and down manually in the case of emergency stops, such as interruption of service, at the time of operation of such a hydraulic lift, the equipment which consists of a wobble pump indicated by these people having existing applied (Japanese Patent Application No. No. 226203 [ 11 to ]) and a manual-switching valve can be installed between the top external port (11) of drawing 1 , and a bottom external port (13).

[0015] It is the meter-out-control method which controls the hydraulic oil which such a hydraulic lift is controlled by the hydraulic circuit shown in drawing 1 , and hydraulic oil is usually sent into a lower cylinder room (7) from the regurgitation port (33) of a hydraulic pump (23) at the time of a rise of a conveyance cage (45), i.e., descent of a cylinder tube (5), and is discharged from an up cylinder room (6) by the electromagnetic-control valve for up cylinder room discharge oils (21). It is the meter-out-control method with which the control at the time of descent of a conveyance cage (45) similarly controls the hydraulic oil discharged from a lower cylinder room (7) by the electromagnetic-control valve for lower cylinder room discharge oils (31).

[0016] In addition, if a man or a load is carried in a conveyance cage when the pressure of an up cylinder room (6) or a lower cylinder room (7) is low, this conveyance cage will descend slightly by compression of an oil. In order to prevent descent of such a conveyance cage, operate the hydraulic pump for hydraulic oil supply (15), the pressure of this up lower cylinder room is made to increase to the setting pressure of a relief valve (16), and it is made to make it stop by a timer etc. thereby, conveyance cages are few -- sinking -- it becomes very small, a problem is almost lost practically, and a good degree of comfort is acquired. The setting pressure of a relief valve (16) is usually used by about 1 / 2 below with a working pressure here.

[0017] In addition, with such movable cylinder equipment, change of the burden of a conveyance cage will give a big change to the internal pressure of a cylinder. That is, when a cylinder-tube side is heavier than a conveyance cage, a top external port (11) (it is described as D port below) side becomes high pressure, and when a conveyance cage side is conversely heavy, a bottom external port (13) (it is described as U port below) side becomes high pressure. And when D port side is high pressure, this cylinder tube can be raised with the load pressure and resisted working pressure. However, when D port side is high pressure in this way, it must be made for U port to have to supply low-pressure hydraulic oil as much as possible from the proof-pressure up of a cylinder tube, although pressure oil is usually supplied to U port when it is going to drop a cylinder tube.

[0018] then, the pressure by the side of D port of a movable cylinder -- about [ of the total burden of a conveyance cage ] -- D port pressure serves as max by making one half into the branch point at the time of burden zero, it becomes this \*\* in U port mostly at this branch point, and, as for the time of a full load, U port side becomes high pressure this more than branch point. Therefore, when the burden of a conveyance cage is 1/2 of zero - all burden, since D port serves as high pressure when it is going to drop a cylinder tube (5), the signal of an up pressure switch (20) is made to perform the bleed off control which gives only the pressure at the time of a bypass to U port with OFF of the electromagnetic-control valve for lower cylinder room oil supply by the side of U port (34). In addition, the bypass pressure screw of this control valve (34) adjusts this pressure. And when it is going to raise a cylinder tube (5) in this case, with the signal of an up pressure switch (20), the electromagnetic-control valve for up cylinder room oil supply (25) is turned ON, and the pressure oil to the setting pressure of the relief valve for up cylinder room oil supply (26) is applied to D port.

[0019] Moreover, if the burden of a conveyance cage turns into 1/2 or less [ of total burden ] and a load turns into 1/2 - a full load, the pressure of D port will fall and U port side will become high pressure. Therefore, by switching the electromagnetic-control valve for lower cylinder room oil supply (34) to ON with the signal of a lower pressure switch (37), when it is going to drop a cylinder tube (5), since a pressure up can be carried out to the setting pressure of the relief valve for lower cylinder room oil supply (35), a smooth rise and a smooth halt can be performed. In addition, whenever [ this speed ], since control is a meter out control, it is performed with the electromagnetic-control valve for up cylinder room discharge oils (21). Moreover, it is the case where U port side is high pressure similarly, and when it is going to raise a cylinder tube (5), the signal of a lower pressure switch (37) performs the bleed off control which gives a bypass pressure to D port with OFF of the electromagnetic-control valve for up cylinder room oil supply (25). In addition, although the pressure switch was formed in this example in both the top external port (11) and the bottom external port (13), it can prepare in one of ports and the signal can also perform the above-mentioned control.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view of the movable cylinder equipment in which one example of this invention is shown.

[Drawing 2] It is an example of this invention hydraulic lift.

[Drawing 3] They are other examples of this invention hydraulic lift.

[Description of Notations]

- 1 Up Piston Rod
- 2 Lower Piston Rod
- 3 Fixed Piston
- 4 Ring-like Packing
- 5 Cylinder Tube
- 6 Up Cylinder Room
- 7 Lower Cylinder Room
- 10 Top Internal Port
- 11 Top External Port
- 12 Bottom Internal Port
- 13 Bottom External Port
- 15 Hydraulic Pump for Hydraulic Oil Supply
- 16 Relief Valve for Supply Circuits
- 17 18 Check valve for supply circuits
- 20 Up Pressure Switch
- 21 Electromagnetic-Control Valve for Up Cylinder Room Discharge Oils
- 22 Check Valve for Up Cylinder Room Discharge Oils
- 23 2-way Regurgitation Mold Hydraulic Pump
- 24 One Regurgitation Port
- 25 Electromagnetic-Control Valve for Up Cylinder Room Oil Supply
- 26 Relief Valve for Up Cylinder Room Oil Supply
- 27 Check Valve for Oil Inhalation
- 30 Oil Tank
- 31 Electromagnetic-Control Valve for Lower Cylinder Room Discharge Oils
- 32 Check Valve for Lower Cylinder Room Discharge Oils
- 33 Regurgitation Port of Another Side
- 34 Electromagnetic-Control Valve for Lower Cylinder Room Oil Supply
- 35 Relief Valve for Lower Cylinder Room Oil Supply
- 36 Check Valve for Oil Inhalation
- 37 Lower Pressure Switch
- 40 Balance Weight
- 41 Cylinder Side Pulley

42 1st Pulley  
43 2nd Pulley  
44 Rope  
45 Conveyance Cage

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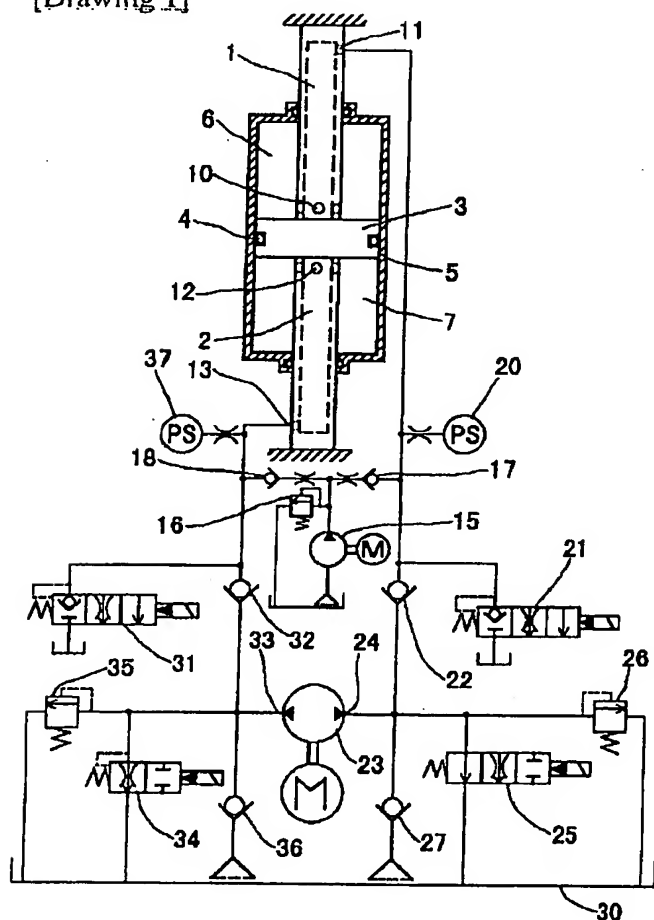
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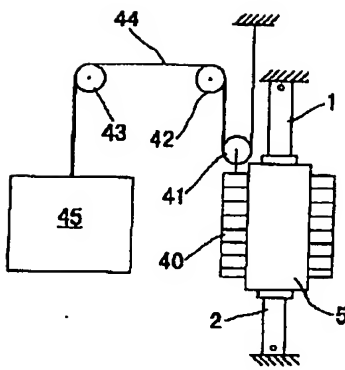
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DRAWINGS

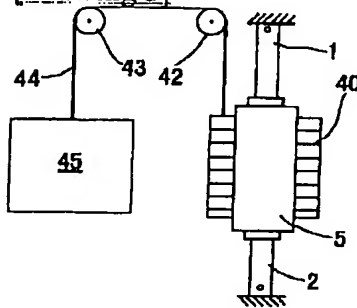
[Drawing 1]



[Drawing 2]



[Drawing 3]



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